```
YSTEM:OS  - DIALOG OneSearch
  File   2:INSPEC  1969-2002/Feb W1
         (c) 2002 Institution of Electrical Engineers
  File   6:NTIS  1964-2002/Feb W4
         (c) 2002 NTIS, Intl Cpyrght All Rights Res
*File   6: See HELP CODES6 for a short list of the Subject Heading Codes
(SC=, SH=) used in NTIS.
  File   8:Ei Compendex(R)  1970-2002/Feb W1
         (c) 2002 Engineering Info. Inc.
  File  34:SciSearch(R) Cited Ref Sci  1990-2002/Feb W2
         (c) 2002 Inst for Sci Info

      Set  Items  Description
      ---  -----  -----------
?s (py<2000 or pd<19990422) and (high(2W)(k or dielectric) or tantalum(w)oxide)(10n)(di
electric or insulator or insulating or insulation) and (anneal? or oxidis? or oxidiz? o
r oxidation)(10n)(water or steam or wet)
>>>One or more prefixes are unsupported
>>>  or undefined in one or more files.
Processing
Processing
      21671391  PY<2000
       2331389  PD<19990422
       3788453  HIGH
       1124156  K
        278964  DIELECTRIC
         20634  HIGH(2W)(K OR DIELECTRIC)
         34212  TANTALUM
        511531  OXIDE
          1570  TANTALUM(W)OXIDE
        278964  DIELECTRIC
         92224  INSULATOR
         95541  INSULATING
         81249  INSULATION
          8747  (HIGH(2W)(K OR DIELECTRIC) OR
                TANTALUM(W)OXIDE)(10N)(((DIELECTRIC OR INSULATOR) OR
                INSULATING) OR INSULATION)
        274122  ANNEAL?
          8947  OXIDIS?
        111560  OXIDIZ?
        356607  OXIDATION
       1285276  WATER
        107642  STEAM
         89408  WET
         28150  (((ANNEAL? OR OXIDIS?) OR OXIDIZ?) OR
                OXIDATION)(10N)((WATER OR STEAM) OR WET)
      S1       6  (PY<2000 OR PD<19990422) AND (HIGH(2W)(K OR DIELECTRIC)
                  OR TANTALUM(W)OXIDE)(10N)(DIELECTRIC OR INSULATOR OR
                  INSULATING OR INSULATION) AND (ANNEAL? OR OXIDIS? OR
                  OXIDIZ? OR OXIDATION)(10N)(WATER OR STEAM OR WET)
?rd
...completed examining records
      S2       6  RD (unique items)
```

none relevant

```
SYSTEM:OS  - DIALOG One[redacted]rch
  File   2:INSPEC  1969-2002/Feb W1
         (c) 2002 Institution of Electrical Engineers
  File   8:Ei Compendex(R)  1970-2002/Feb W1
         (c) 2002 Engineering Info. Inc.

      Set  Items  Description
      ---  -----  -----------
>>>One or more prefixes are unsupported
>>>  or undefined in one or more files.
Processing
        11167637  PY<2000
           20578  PD<19990422
         2101006  HIGH
          632017  K
          204588  DIELECTRIC
           10333  HIGH(2W)(K OR DIELECTRIC)
           22693  TANTALUM
          248962  OXIDE
            1097  TANTALUM(W)OXIDE
          114939  GATE
          204588  DIELECTRIC
            1949  GATE(2N)DIELECTRIC
           71644  INSULATOR
           77908  INSULATING
           61678  INSULATION
             405  (HIGH(2W)(K OR DIELECTRIC) OR
                  TANTALUM(W)OXIDE)(10N)(((GATE(2N)DIELECTRIC OR INSULATOR)
                  OR INSULATING) OR INSULATION)
          196411  ANNEAL?
            4168  OXIDIS?
           45389  OXIDIZ?
          138271  OXIDATION
      S1      41  (PY<2000 OR PD<19990422) AND (HIGH(2W)(K OR DIELECTRIC)
                  OR TANTALUM(W)OXIDE)(10N)(GATE(2N)DIELECTRIC OR INSULATOR
                  OR INSULATING OR INSULATION) AND (ANNEAL? OR OXIDIS? OR
                  OXIDIZ? OR OXIDATION)
?rd
...completed examining records
      S2      35  RD (unique items)
```

2/9/3 (Item 3 from file: 2)
DIALOG(R)File 2:INSPEC

6558547 INSPEC Abstract Number: B2000-05-0520F-096
Title: Atomic layer deposition of Ta/sub 2/O/sub 5/ films using Ta(OC/sub 2/H/sub 5/)/sub 5/ and NH/sub 3/
Author(s): Hyun-Jung Song; Wonyong Koh; Sang-Won Kang
Author Affiliation: Dept. of Mater. Sci. & Eng., Korea Adv. Inst. of Sci. & Technol., Seoul, South Korea
Conference Title: Ultrathin SiO/sub 2/ and High-K Materials for ULSI Gate Dielectrics. Symposium p.469-71
Editor(s): Huff, H.R.; Richter, C.A.; Green, M.L.; Lucovsky, G.; Hattori, T.
Publisher: Materials Research Society, Warrendale, PA, USA
Publication Date: 1999 Country of Publication: USA xvii+615 pp.
Material Identity Number: XX-1999-02940
Conference Title: Ultrathin SiO/sub 2/ and High-K Materials for ULSI Gate Dielectrics. Symposium
Conference Date: 5-8 April 1999 Conference Location: San Francisco, CA, USA
Language: English Document Type: Conference Paper (PA)
Treatment: Experimental (X)
Abstract: Tantalum oxide films were grown by chemical vapor deposition using an alternating supply of tantalum pentaethoxide and ammonia. The supply of one source was followed by a purge with argon gas before introducing the other source onto the substrate in order to prevent gas-phase reactions. At substrate temperature between 250-275 degrees C the film growth depended only on the number of source supply cycles (0.15 nm/cycle) and did not depend on the substrate temperature nor supply time of the sources. As-deposited films were amorphous, however, were crystallized after **annealing** at 800 degrees C in oxygen atmosphere by rapid thermal process. **Annealed** films showed increased dielectric constant and decreased leakage current density, which were 13.3 and 6.6 mu A/cm/sup 2/ at 1 MV/cm, respectively, for a 15-nm-thick film after **annealing** at 800 degrees C for 10 minutes. (5 Refs)
Subfile: B
Descriptors: chemical vapour deposition; dielectric thin films; leakage currents; permittivity; rapid thermal **annealing** ; tantalum compounds
Identifiers: atomic layer deposition; tantalum oxide film; chemical vapor deposition; tantalum pentaethoxide; ammonia; rapid thermal **annealing** ; dielectric constant; leakage current density; **high - K gate dielectric** ; 250 to 275 C; 800 C; Ta/sub 2/O/sub 5

2/9/10 (Item 10 fro ile: 2)
DIALOG(R)File 2:INSPEC

6021766 INSPEC Abstract Number: A9820-6822-017, B9810-2530F-029
Title: Intermixing at the tantalum oxide **/silicon interface in** gate dielectric **structures**
Author(s): Alers, G.B.; Werder, D.J.; Chabal, Y.; Lu, H.C.; Gusev, E.P.; Garfunkel, E.; Gustafsson, T.; Urdahl, R.S.
Author Affiliation: Lucent Technol., AT&T Bell Labs., Murray Hill, NJ, USA
Journal: Applied Physics Letters vol.73, no.11 p.1517-19
Publisher: AIP,
Publication Date: 14 Sept. 1998 Country of Publication: USA
CODEN: APPLAB ISSN: 0003-6951
SICI: 0003-6951(19980914)73:11L.1517:ITOS;1-1
Material Identity Number: A135-98037
U.S. Copyright Clearance Center Code: 0003-6951/98/73(11)/1517(3)/$15.00
Document Number: S0003-6951(98)04637-3
Language: English Document Type: Journal Paper (JP)
Treatment: Applications (A); Practical (P); Experimental (X)
Abstract: Metal oxides with high dielectric constants have the potential to extend scaling of transistor gate capacitance beyond that of ultrathin silicon dioxide. However, during deposition of most metal oxides on silicon, an interfacial region of SiO/sub x/ can form that limits the specific capacitance of the gate structure. We have examined the composition of this layer using high-resolution depth profiling of medium ion energy scattering combined with infrared spectroscopy and transmission electron microscopy. We find that the interfacial region is not pure SiO/sub 2/, but is a complex depth-dependent ternary oxide of Si-Ta/sub x/-O/sub y/ with a dielectric constant at least twice that of pure SiO/sub 2/ as inferred from electrical measurements. High-temperature **annealing** crystallizes the Ta/sub 2/O/sub 5/ film and converts the composite oxide to a more pure SiO/sub 2/ layer with a lower capacitance density. Using low postanneal temperatures, a stable composite oxide structure can be obtained with good electrical properties and an effective SiO/sub 2/ thickness of less than 2 nm with ~10 nm of composite oxide. (10 Refs)

downloaded article

2/9/11 (Item 11 from file: 2)
DIALOG(R)File 2:INSPEC

5967132 INSPEC Abstract Number: A9816-7755-022, B9808-2810D-005
Title: Tantalum pentoxide (Ta/sub 2/O/sub 5/) thin films for advanced dielectric applications
Author(s): Chaneliere, C.; Autran, J.L.; Devine, R.A.B.; Balland, B.
Author Affiliation: Lab. de Phys. de la Matiere, Inst. Nat. des Sci. Appliquees de Lyon, Villeurbanne, France
Journal: Materials Science & Engineering R: Reports vol.R22, no.6 p.269-322
Publisher: Elsevier,
Publication Date: 25 May 1998 Country of Publication: Switzerland
CODEN: MIGIEA ISSN: 0927-796X
SICI: 0927-796X(19980525)R22:6L.269:TPTT;1-E
Material Identity Number: B323-98012
U.S. Copyright Clearance Center Code: 0927-796X/98/$19.00
Document Number: S0927-796X(97)00023-5
Language: English Document Type: Journal Paper (JP)
Treatment: Experimental (X); Theoretical (T); General, Review (G)

Abstract: This paper reviews the present knowledge on tantalum pentoxide (Ta/sub 2/O/sub 5/) thin films and their applications in the field of microelectronics and integrated microtechnologies. Different methods used to produce tantalum oxide layers are described, emphasizing elaboration mechanisms and key parameters for each technique. We also review recent advances in the deposition of Ta/sub 2/O/sub 5/ in the particular field of microelectronics where high quality layers are required from the structural and electrical points of view. The physical, structural, optical, chemical and electrical properties of tantalum oxide thin films on semiconductors are then presented and essential film parameters, such as optical index, film density or dielectric permittivity, are discussed. After a reminder of the basic mechanisms that control the bulk electrical conduction in insulating films, we carefully examine the origin of leakage currents in Ta/sub 2/O/sub 5/ and present the state-of-the-art concerning the **insulating** behaviour of **tantalum oxide** layers. Finally, applications of **tantalum oxide** thin films are presented in the last part of this paper. We show how Ta/sub 2/O/sub 5/ has been employed as an antireflection coating, insulating layer, gate oxide, corrosion resistant material, and sensitive layer in a wide variety of components, circuits and sensors. (324 Refs)

2/9/13 (Item 13 fr[redacted]ile: 2)
DIALOG(R)File 2:INSPEC

5271240 INSPEC Abstract Number: A9612-7755-005, B9607-2810F-005
Title: Stability of BaTiO/sub 3/ thin films on Si
Author(s): Chang, L.H.; Anderson, W.A.
Author Affiliation: Dept. of Electr. & Comput. Eng., State Univ. of New York, Buffalo, NY, USA
Journal: Applied Surface Science Conference Title: Appl. Surf. Sci. (Netherlands) vol.92 p.52-6
Publisher: Elsevier,
Publication Date: Feb. 1996 Country of Publication: Netherlands
CODEN: ASUSEE ISSN: 0169-4332
SICI: 0169-4332(199602)92L.52:SBTF;1-8
Material Identity Number: I974-96003
U.S. Copyright Clearance Center Code: 0169-4332/96/$15.00
Conference Title: Seventh International Conference on Solid Films and Surfaces
Conference Date: 12-16 Dec. 1994 Conference Location: Hsinchu, Taiwan
Language: English Document Type: Conference Paper (PA); Journal Paper (JP)
Treatment: Applications (A); Practical (P); Experimental (X)
Abstract: A very high quality BaTiO/sub 3//p-Si interface and BaTiO/sub 3/ **insulator** gates with **high dielectric** constant and low leakage current were produced by RF magnetron sputtering of BaTiO/sub 3/ on (100) p-Si at a substrate temperature of 500 degrees C, followed by in situ **annealing** at 500 degrees C for 10 min. The reliability of the dielectric, however, plays an important role in determining the practical usage of ferroelectric random access memory applications. Thermal treatment of Au/BaTiO/sub 3//Si capacitors at 150 degrees C for 800 h showed no change of leakage current and a slight increase in leakage from 1.1*10/sup -9/ A/cm/sup 2/ for the as-deposited BaTiO/sub 3/ to 1.8*10/sup -9/ A/cm/sup 2/ for the samples after 1000 h at a field of 1.3*10/sup 5/ V/cm. The effects of fatigue were also studied and found to not affect the electrical and charge properties of BaTiO/sub 3/ on Si for 10/sup 10/ cycles of fatigue. (8 Refs)

2/9/28 (Item 3 from file: 8)
DIALOG(R)File 8:Ei Compendex(R)

05252377 E.I. No: EIP99034599443
Title: Effect of barrier layer on the electrical and reliability characteristics of high - k gate dielectric **films**
Author: Jeon, Yongjoo; Lee, Byoung Hun; Zawadzki, Keith; Qi, Wen-Jie; Lucas, Aaron; Nieh, Renee; Lee, Jack C.
Corporate Source: Univ of Texas at Austin, Austin, TX, USA
Conference Title: Proceedings of the 1998 IEEE International Electron Devices Meeting
Conference Location: San Francisco, CA, USA Conference Date: 19981206-19981209
Sponsor: IEEE
E.I. Conference No.: 49917
Source: Technical Digest - International Electron Devices Meeting 1998. IEEE, Piscataway, NJ, USA,98CH36217. p 797-800
Publication Year: 1998
CODEN: TDIMD5 ISSN: 0163-1918
Language: English
Document Type: CA; (Conference Article) Treatment: X; (Experimental)
Journal Announcement: 9905W2
Abstract: Electrical and reliability characteristics of several metal/high-k/(barrier layer)/Si capacitor structures have been investigated. The equivalent oxide thickness (EOT) increased as the **annealing** temperature increased, especially in oxygen ambient. Jet vapor-deposited (JVD) nitride was found to be a good **oxidation** barrier which is important for achieving thin EOT. Introducing TiO//2 as a barrier layer reduced the leakage current and EOT of Pt/BST/Si capacitor. The conduction mechanism in Pt/TiO//2/Si structure was found to be tunneling-like behavior limited by the interfacial layer. Hysteresis could be minimized by the optimization of the **annealing** process. In reliability characteristics, TiO//2 revealed no significant degradation and exhibited better wear-out properties than conventional SiO//2. (Author abstract) 6 Refs.

down loaded article